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09/892,566	06/28/2001	Baruch Solomon	2207/10607	2824

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KENYON & KENYON  
1500 K STREET, N.W., SUITE 700  
WASHINGTON, DC 20005

EXAMINER

PORTKA, GARY J

ART UNIT	PAPER NUMBER
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2188

DATE MAILED: 02/13/2004

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Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

09/892,566

Applicant(s)

SOLOMON ET AL.

Examiner

Gary J Portka

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 28 June 2001.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-22 is/are pending in the application.
- 4a) Of the above claim(s) 16-22 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-15 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 28 June 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 2, 6.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

**DETAILED ACTION**

***Election/Restrictions***

1. Restriction to one of the following inventions is required under 35 U.S.C. 121:
  - I. Claims 1-15, drawn to a front-end processing system including UPO and instruction cache, and to a cache with lookup, delay element, and data fetch unit, classified in class 711, subclass 118.
  - II. Claims 16-22, drawn to a cache with fields of offset data and byte length data referring to source data in another cache, classified in class 711, subclass 119.

(It is also noted that Examiner originally required restriction of claims 7-9 as a separate group, but was convinced by Applicant's representative that these did not add undue burden in light of claims 4 and 5.)

The inventions are distinct, each from the other because of the following reasons:

2. Inventions I and II are related as subcombinations disclosed as usable together in a single combination. The subcombinations are distinct from each other if they are shown to be separately usable. In the instant case, invention I has separate utility such as a UOP cache and instruction cache combination, or cache with lookup, delay, and data fetch units, without regard to having fields of offset data and byte length referring to source data in another cache. See MPEP § 806.05(d).
3. Because these inventions are distinct for the reasons given above and have acquired a separate status in the art as shown by their different classification, restriction for examination purposes as indicated is proper.

4. Because these inventions are distinct for the reasons given above and the search required for Group I is not required for Group II, restriction for examination purposes as indicated is proper.

5. During a telephone conversation with Bob Hails on December 19, 2003 a provisional election was made without traverse to prosecute the invention of Group I, claims 1-15. Affirmation of this election must be made by applicant in replying to this Office action. Claims 16-22 are withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

6. Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a request under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

***Information Disclosure Statement***

7. The information disclosure statements (IDS) submitted on July 16, 2001 and June 28, 2001 (paper nos. 2 and 6 respectively) were considered by the examiner.

***Claim Objections***

8. Claims are objected to because of the following informalities: Claim 9 is identical to claim 8. Appropriate correction is required.

***Claim Rejections - 35 USC § 102***

9. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

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A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

10. Claims 1-4 and 10-13 are rejected under 35 U.S.C. 102(b) as being anticipated by Friendly et al., "Alternative Fetch and Issue Policies for the Trace Cache Fetch Mechanism".

11. As to claim 1, Friendly discloses a front-end processing system for a processor comprising UOP cache (Trace Cache) and instruction cache having inputs coupled to a common addressing input (at PC), the UOP cache having out hit/miss indicator (Trace Cache Miss), and instruction processing system in communication with the instruction cache, having an enabling control input coupled to the UOP hit/miss output (at the pass gate shown below the Decoder, Fig. 1, see also sections 2 and 3; passing of the signal at the gate effectively enables the circuit above it).

12. As to claim 2, in Friendly the instruction cache inherently comprises a lookup units and fetch unit; the enabling input described above with regard to claim 1 may be considered for the cache fetch unit (in the Instruction Cache above the pass gate in Fig. 1).

13. As to claim 10, Friendly discloses the front-end as described above with regard to partly claim 1, and claim 2 (not passing the signal at the gate effectively disables the circuit above it).

14. As to claim 11, Friendly discloses the front-end as described above with regard to claim 1.

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15. As to claims 3 and 12, in Friendly the instruction decoder is shown, and the instruction synchronizer may be considered the pass gate described above with regard to claim 1, since it synchronizes the output with the hit/miss indication of the trace cache.

16. As to claims 4 and 13, a UOP cache inherently comprises lookup unit and fetch unit, coupled to the hit/miss output.

17. Claims 7-9 are rejected under 35 U.S.C. 102(b) as being anticipated by Sheppard et al., U.S. Patent 5,913,223.

18. As to claim 7, Sheppard discloses a cache (see Abstract, Figs. 3, 4, and 6) comprising cache lookup unit 60, delay element coupled to the lookup unit 64, and data fetch unit coupled to the delay element (considering the data fetch unit as either the STATUS RAM of Fig. 4, or as 126 of Fig. 6). See Sheppard Abstract, col. 3 lines 59-67, col. 4 line 63 to col. 5 line 2, col. 5 lines 33-39, and col. 6 lines 61-67.

19. As to claims 8 and 9, Sheppard discloses the cache having plurality of entries, and lookup unit with tag fields and comparator (Fig. 4).

***Claim Rejections - 35 USC § 103***

20. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

21. Claims 5-6 and 14-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Friendly et al., "Alternative Fetch and Issue Policies for the Trace Cache Fetch Mechanism", in view of Sheppard et al., U.S. Patent 5,913,223.

22. As to claim 5, Friendly discloses the invention substantially as described above with regard to claims 1-4 and 10-13. Friendly does not disclose the UOP cache comprising a delay element between the lookup unit and data fetch unit. However, Sheppard teaches that power consumption of a cache may be reduced by delaying access of a data unit until it is known if there is a hit via the lookup unit. See Sheppard Abstract, col. 3 lines 59-67, col. 4 line 63 to col. 5 line 2, col. 5 lines 33-39, and col. 6 lines 61-67. Sheppard therefore shows the motivation for adding a delay between the lookup unit and data fetch unit as recited. Thus it would have been obvious to one of ordinary skill in the art at the time of the invention to use a delay element between the lookup unit and the data fetch unit, because this was a known means of reducing power consumption of a cache.

23. As to claims 6, 14, and 15, the additional limitation of delay corresponding to a processing time of the instruction processing system is inherent to the extent recited (the delay indeed may be considered to influence the processing time); the delay element is controlled by the hit/miss indicator to the extent that only upon a hit will the delay element forward to address to the next stage.

### ***Conclusion***

24. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Patent No.

6,535,959 B1      Reducing instruction cache power consumption.

Solomon et al., "Micro-Operation Cache: A Power Aware Frontend for Variable Instruction Length ISA", ISLPED'01, August 6-7, 2001.

25. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Gary J Portka whose telephone number is (703) 305-4033. The examiner can normally be reached on M-F 9:30 AM - 6:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mano Padmanabhan can be reached on (703) 306-2903. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 305-3900.

Gary J Portka  
Primary Examiner  
Art Unit 2188



February 10, 2004